

WE CLAIM:

1. A method of converting a non-effusion combustor liner to an effusion combustor liner, comprising:

making at least one of a modular inner effusion panel subassembly and a modular outer effusion panel subassembly remote from
5 said non-effusion combustor liner;

removing at least one of a non-effusion inner panel and a non-effusion outer panel from said non-effusion combustor liner; and

replacing said at least one non-effusion inner and outer panel with
said at least one modular effusion inner and outer panel.

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2. The method of claim 1, wherein said modular outer effusion panel subassembly comprises:

six rows of first effusion holes proximate to one end of said effusion panel and wherein at least one of said six rows includes 239 first
5 effusion holes; and

five rows of second effusion holes distal from said one end of said effusion panel and wherein at least one of said five rows includes 281 second effusion holes.

3. The method of claim 1, wherein said modular inner effusion panel subassembly comprises one of:

four rows of third effusion holes and wherein at least one of said four rows includes 181 third effusion holes; and

5 five rows of fourth effusion holes and wherein at least one of said five rows includes 206 fourth effusion holes.

4. The method of claim 1, wherein said liner panel subassemblies are removeably affixed to a dome subassembly of said combustor liner.

5. The method of claim 4, wherein said liner panel subassemblies comprise both the modular outer panel subassembly and inner panel subassembly.

6. The method of claim 1, wherein said modular inner liner panel subassembly comprises a plurality of inner panels removeably affixed to one another.

7. The method of claim 1, wherein said modular outer liner panel subassembly comprises a plurality of outer panels removeably affixed to one another.

8. A method of converting a non-effusion combustor liner to an effusion combustor liner, comprising:

making a first modular effusion liner panel subassembly remote from said non-effusion combustor liner;

5 removing a first non-effusion liner panel subassembly from said non-effusion combustor liner;

replacing said first non-effusion liner panel subassembly with said first modular effusion liner panel subassembly;

10 wherein said first modular effusion liner panel subassembly includes:

six rows of first effusion holes proximate to one end of said first effusion liner panel subassembly and wherein at least one of said six rows includes 239 first effusion holes; and

five rows of second effusion holes distal from said one end of said

15 first effusion liner panel subassembly and wherein at least one of said five rows includes 281 second effusion holes.

9. The method of claim 8, further comprising:

removing a second non-effusion liner panel subassembly from said non-effusion combustor liner; and

replacing said second non-effusion liner panel subassembly with a

5 second modular effusion liner panel subassembly.

10. The method of claim 9, wherein said second modular liner panel subassembly includes one of:

four rows of third effusion holes and wherein at least one of said four rows includes 181 third effusion holes; and

5 five rows of fourth effusion holes and wherein at least one of said five rows includes 206 fourth effusion holes.

11. The method of claim 8, wherein said first modular effusion liner panel subassembly is removeably affixable to a dome subassembly of said combustor liner.

12. The method of claim 11, wherein said first modular effusion liner panel subassembly comprises:

a first outer panel subassembly and

a second inner panel subassembly that interfaces said first outer

5 panel subassembly.

13. A method of repairing a combustor liner, comprising:
 - making a first modular effusion panel of a first modular liner panel subassembly remote from said combustor liner;
 - removing a first damaged panel from said combustor liner;
 - replacing said first damaged panel with said first modular effusion panel;
 - wherein said first modular effusion panel includes:
 - six rows of first effusion holes proximate to one end of said first effusion panel and wherein at least one of said six rows includes 239 first effusion holes; and
 - five rows of second effusion holes distal from said one end of said first effusion panel and wherein at least one of said five rows includes 281 second effusion holes.
14. The method of claim 13, further comprising:
 - making a second modular effusion panel of a second modular liner panel subassembly remote from said combustor liner;
 - removing a second damaged panel from said combustor liner;
 - replacing said second damaged panel with said second modular effusion panel;
 - wherein said second modular effusion panel includes one of:
 - four rows of third effusion holes and wherein at least one of said four rows includes 181 third effusion holes; and
 - five rows of fourth effusion holes and wherein at least one of said five rows includes 206 fourth effusion holes.
15. The method of claim 13, wherein said making a first modular effusion panel includes making at least one of said first effusion holes and second effusion holes remote from said combustor liner.

16. The method of claim 14, wherein said making a second modular effusion panel includes making at least one of said third effusion holes and fourth effusion holes remote from said combustor liner.

17. The method of claim 14, wherein said removing said first and second damaged panel includes removing one of said first and second damaged panels from a dome subassembly of said combustor liner.

18. The method of claim 14, wherein said removing said first and second damaged panels includes removing one of said first and second damaged panels from an un-damaged panel of said combustor liner.

19. A method of repairing a combustor liner, comprising:
making a modular effusion panel of a liner panel subassembly
remote from said combustor liner;
removing a damaged panel from said combustor liner;
5 replacing said damaged panel with said modular effusion panel;
wherein said modular effusion panel comprises one of a first
modular effusion panel and a second modular effusion panel;
said first modular effusion panel including:
six rows of first effusion holes proximate to one end of said first
10 effusion panel and wherein at least one of said six rows includes 239 first
effusion holes; and
five rows of second effusion holes distal from said one end of said
first effusion panel and wherein at least one of said five rows includes 281
second effusion holes;
15 said second modular effusion panel including one of:
four rows of third effusion holes and wherein at least one of said

four rows includes 181 third effusion holes; and

five rows of fourth effusion holes and wherein at least one of said five rows includes 206 fourth effusion holes.

20. The method of claim 19, wherein said making modular effusion panels includes making at least one of said first effusion holes, second effusion holes, third effusion holes, and fourth effusion holes remote from said combustor liner.

21. The method of claim 19, wherein said removing said damaged panel includes removing said damaged panel from a dome subassembly of said combustor liner.

22. The method of claim 19, wherein said removing said damaged panel includes removing said damaged panel from an un-damaged panel of said combustor liner.

23. The method of claim 19, wherein at least three of said first and second effusion holes are arranged in an equilateral triangle configuration.

24. The method of claim 19, wherein at least one of said first and second effusion holes is characterized by an angle between about 15 and 25 degrees.

25. The method of claim 19, wherein at least one of said first and second effusion holes is characterized by a diameter about 17/1000 and 23/1000 inches.

26. The method of claim 19, wherein at least two of said first and

second effusion holes are separated by about 200/1000 inches.

27. The method of claim 19, wherein said combustor liner is part of a turbine engine.